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BOOK REVIEWS

GLACIAL ENVIRONMENTS by M. Hambrey, UCL Press, London, 1994. No. of pages: viii + 296. Price: £14.94 (pb). ISBN 1-85728-004-0.

Glacial Environments is a textbook aimed at students interested in glacial sediments. The rationale for the book is that the study of the Quaternary and glacial processes has been largely neglected in British geology departments. Rather, Hambrey argues that it has been left to geomorphologists in Geography departments, and perhaps as a result there has been a tendency to avoid rigorous application of sedimentological principles. The book aims to restore the balance by focusing on sediments and integrating the approaches of geomorphology and geology. More specifically, Hambrey wishes (a) to examine glacial processes; (b) to emphasize the range and character of glacial landforms; (c) to link Quaternary experience with the rock record of ancient glaciations; and (d) to stress the importance of the glaciomarine environment, which has been neglected in most textbooks.

How successful is the book in meeting these aims? It certainly succeeds in stressing the importance of glacial sediments. The introductory chapter is a useful discussion of approaches to sediment classification and methods of analysis. Most of the rest of the book deals with glacial sediments in different glacial environments, notably on land, in lakes and in the sea. Perhaps the highlights are the two chapters on glaciomarine processes and sediments. In these, Michael Hambrey draws on his own extensive experience and identifies interesting contrasts between the Arctic, where meltwater is important, and the Antarctic, where meltwater is essentially absent; the glaciomarine processes and resulting sediments in Alaska and the Antarctic are quite different. Another highlight is the discussion of structures and foliation in glaciers, another field where Hambrey uses his own specialist experience. Throughout the book a neat perspective is introduced by constant reference to the way in which the study of modern sediments can help in the understanding of ancient glaciations, whose traces are preserved only in the rock record. We realize just how often Ice Ages affect the Earth.

There are nice touches to the book. There is a fresh historical perspective drawing attention to the role of early researchers in the Alps, and the effective use of a pack of cards as an analogy for foliation. Also, there are diagrams showing glaciations and the geological time scale as well as alternative methods of classifying sediments. There is a comprehensive ten-page glossary of technical terms and a full bibliography.

The coverage of glacial processes and landforms is less convincing. One reason for this is the decision to spare no more than one chapter to glacier dynamics, spanning ice characteristics, glacier flow, morphology, thermal regime, hydrology, response to climate, surges and debris transport. The result is a gallop where there is room for little more than a mention of the key processes, devoid of an explanation of why they occur and why they are important. Another reason is that the approach is very much that of an inductivist, with a focus on classification and description. This means that glaciological theory is underplayed. For example, ideas in key papers by Hallet, Iverson and Shreve are not mentioned when discussing abrasion, plucking and meltwater, respectively. Whereas Hambrey is certainly able to emphasize the range and character of glacial landforms, it is partly at the expense of insight and understanding.

But perhaps this is to carp unnecessarily. It is only too easy to ask for more in a book. Glacial sediments are important and perhaps glaciologists and geomorphologists have been cavalier in their approach in the past. This book restores the balance and is a useful addition to the glacial literature.

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MECHANICS IN THE EARTH AND ENVIRONMENTAL SCIENCES by Gerard V. Middleton and Peter R. Wilcock, Cambridge University Press, Cambridge, 1994. No. of pages: 459. Price: £50.00 (hb); £22.95 (pb). ISBN 0521 441242 (hb); 0521 446694 (pb).

Only a minority of geography and environmental science students pay more than lip service to the 'physical' in physical geography. Although good undergraduate courses, and some good research, can proceed without a proper understanding of relevant scientific principles from physics and chemistry, most of our work will benefit from, and some explicitly require, a good grounding in scientific principles. This book is intended to provide a broad working knowledge of continuum mechanics, and its application to earth and environmental sciences. Its authors come from Geography and Geology Schools in

North America, where these needs are more widely recognized than in most UK departments.

A review section explains what continuum mechanics is, about equations of motion, vectors and fluids. The topics covered include dimensional analysis, pressure and consolidation, flow through porous media, strain and elasticity, viscous fluids, flows of natural materials, turbulence and thermal convection. It is natural to draw comparisons, both in level and content, with Turcotte and Schubert's (1982) standard text on *Geodynamics*. Middleton and Wilcock generally pay greater attention to the problems related to fluid flow, and somewhat less to behaviours associated with rock, particularly its brittle behaviour. The levels of detail and presentation are, however, very similar. The target audience thus appears to be very well defined as earth surface scientists, including those concerned with rivers, although restriction to continuum mechanics limits application to particulate systems, such as those involved in bedload transport or movement on scree slopes. The book also provides some background material for atmospheric scientists, and for civil engineers on geotechnics, but in both cases there are texts which are more particularly focused.

Should you buy this book, or recommend it to students? In terms of relevance and importance of its content, the answer is a very clear affirmative, but in many cases this must be qualified by the preparedness of many students for material at this level. Students with only 'A' level or high-school mathematics will almost certainly struggle with the relatively high-level approach, and only the most dedicated will survive the experience. This must raise the question of how we select and train our students in earth and environmental sciences and physical geography. If we are not able to bring at least some of our students up to a high level, by selecting at least some with a proper scientific background and providing them with challenging course material, we may condemn ourselves to playing a second-class role in the future development of our science.

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Turcotte, D. L. and Schubert, G. 1982. *Geodynamics: Applications of Continuum Physics to Geological Problems*, John Wiley & Sons, New York 450 pp.

VOLCANOES by A. Scarth, UCL Press, London, 1994. No. of pages: xiii + 273. Price: £40 (hb); £14.90 (pb). ISBN 1-85728-233-X (hb); 1-8582-224-8 (pb).

In recent years, several introductory texts on volcanoes have been published, and this recent work by Alwyn Scarth enters an already crowded market. Written from what the author claims to be a geographical perspective, the volume attempts to avoid jargon and concentrates instead on 'volcanoes as landscape features and the different impacts that their eruptions have had upon the landscape and the populations around them' (p. xi).

At one level, the aim of this volume to introduce volcanoes in a non-technical, jargon-free manner is fulfilled admirably and the author holds the reader's interest as he introduces volcanoes (Chapters 1 and 2); surveys global volcanic activity (Chapters 3–6); discusses volcanic landforms (Chapters 7–14); and reviews the progress made in the prediction of volcanic activity (Chapter 15). Alwyn Scarth writes with a fluent style, and his photographs and line drawings are of excellent quality and clearly reproduced. Examples and case studies are well chosen and wide-ranging, and the author uses information on historical as well as contemporary eruptions to good effect. It is, for instance, very pleasing to see the varied volcanic activity and landforms of the Azores, the Canary Islands and the Aegean rubbing shoulders with the more familiar examples from Italy and the American west. The author's use of such a wealth of foreign-language source material — which is rarely reviewed in English — is to be greatly commended, since volcanology is becoming increasingly dominated by publications in English. For the general reader interested in visiting a volcanic region, this is a good introduction, the only concern being its high price even in paperback.

Although claimed to be for 'students of geography, the earth sciences and the environmental sciences' (preface), this book is not a suitable introductory volume for these groups. All teachers of the earth sciences welcome textbooks which are not only readable but which also interest, inspire and inform first-year students. Scarth's book, however, is actually oversimplified, and glosses over many important issues. For instance, the principal area in which progress has been made during the last two decades is in linking descriptive volcanology to physical processes. Research by a distinguished cast list, which includes G. P. L. Walker, R. S. J. Sparks, K. Wohletz, G. Heiken and many others, has been instrumental in bringing this about. By divorcing the descriptive study of volcanoes from an equally high-level study of processes, Scarth fails to allow the student to explore this important and stimulating research frontier adequately. Much of the recent literature is cited in the selections of 'further reading' (pp. 260–261), but by not focusing it directly on his excellent landform descriptions, Scarth fails to exploit the potential of his volume as an introductory student text. Furthermore, the decision not to include direct reference citations because of space